National Institute of Environmental Health Sciences

The ozone component of global change: Potential effects on agricultural and horticultural plant yield, product quality and interactions with invasive species

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Abstract:

The productivity, product quality and competitive ability of important agricultural and horticultural plants in many regions of the world may be adversely affected by current and anticipated concentrations of groundlevel ozone (O3). Exposure to elevated O3 typically results in suppressed photosynthesis, accelerated senescence, decreased growth and lower yields. Various approaches used to evaluate O3 effects generally concur that current yield losses range from 5% to 15% among sensitive plants. There is, however, considerable genetic variability in plant responses to O3. To illustrate this, we show that ambient O3 concentrations in the eastern United States cause substantially different levels of damage to otherwise similar snap bean cultivars. Largely undesirable effects of O3 can also occur in seed and fruit chemistry as well as in forage nutritive value, with consequences for animal production. Ozone may alter herbicide efficacy and foster establishment of some invasive species. We conclude that current and projected levels of O3 in many regions worldwide are toxic to sensitive plants of agricultural and horticultural significance. Plant breeding that incorporates O3 sensitivity into selection strategies will be increasingly necessary to achieve sustainable production with changing atmospheric composition, while reductions in O3 precursor emissions will likely benefit world food production and reduce atmospheric concentrations of an important greenhouse gas.

Source: Ask your librarian to help locate this item.

Resource Description

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience:

audience to whom the resource is directed

Researcher

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Ecosystem Changes, Food/Water Security

Air Pollution: Ozone

Food/Water Security: Agricultural Productivity

Geographic Feature: ☒

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☒

resource focuses on specific location

United States

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☒

format or standard characteristic of resource

Review

Timescale: ☒

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content